Preface

The Boundary Element Method is a powerful numerical technique well rooted in everyday engineering practice. This is shown by boundary element methods included in the most important commercial computer packages and in the continuous publication of books composed to explain the features of the method to beginners or practicing engineers.

Along our life as engineers we have seen abundant applications of the method to fields as varied as acoustics, earthquake engineering, soil mechanics, aerodynamics, fracture mechanics, etc.

But, in addition, the Boundary Element Method continues to offer a very attractive area where new ideas and capabilities are being currently tested. There is a lively activity that is periodically reported upon in specialized Conferences or special sessions in broader Congresses as well as, of course, in papers published in technical journals treating the intricacies of numerical methods but also in those dedicated to new engineering applications.

The objective of this *Computers & Structures* issue is to show the richness of approaches that are currently treated by a group of authors of different countries that have significantly contributed to the progress of the method.

It is shown that both linear and nonlinear problems can be analyzed and that the solutions obtained cover classical engineering problems as well as new topics that progress of science puts under the limelight.

The editors of this Special Issue started to work on singular integral equations in 1975 following the analytical approach of Mushkelisvili and Kupradze but around 1976 they discovered the possibilities of the numerical approach. Precisely, it was the appeal of a "semi-analytical" approach that attracted us, as well as the reduced demand on computer speed and memory that was very important in those days.

On the other hand, it was necessary to overcome the prevailing distrust of collocation methods, the problematic performances of indirect methods and, overall, the tide of research dedicated to the Finite Element Method that was the dominating paradigm in university research.

Our first paper in *Computers & Structures* on Boundary Elements was published in 1979 (C & S 10, pp. 351–362), so this Special Issue is for us not only the accomplishment of our obligation to show other colleagues the possibilities of a numerical technique in which we believe, but also the celebration of our particular silver jubilee with this Journal.

Along those 25 years we have enjoyed the friendship (and criticism as well!) of extraordinary researchers, either colleagues or students, and the authors contributing to this Special Issue are a sample of them. To all of those authors we are pleased to express our gratitude for their unconditional cooperation as well as for the high quality of their contributions.

It is interesting to see that many of the initial problems of the methods still provide a field for research. For instance the BEM–FEM coupling (Bonnet, Frangi), the use and treatment of fundamental solutions (Schanz, Sladek, Wen), new methods for integration and equation solvers (Frangi, Hermannns, Schanz) and even the use of Hermitian elements and p-adaptive philosophies (Gray, Gallego).

All these topics are interwoven with different applications among which there are those for which the BEM is especially suitable, namely, fracture (Cisilino, Graciani, Saez, Selvadurai), wave propagation and earthquake engineering (Abascal, Alvarez, Beskos, Maeso), and also the treatment of nonlinear behaviour of plates (Mukherjee, Wen).

It is worthwhile to notice the great variety of problems and media to which the BEM can be applied, including heterogeneous and anisotropic media, piezoelectricity, magnetomechanics and poroelasticity; clearly, the usefulness of the BEM is enormous in all engineering fields including biomechanics.

This is why the editors of this Special Issue hope that this sample of publications of current research and applications will be appealing to researchers and students.

In any case we would like to finish these words expressing our sincere thanks to the Co-Editors of *Computers & Structures*, Prof. K.J. Bathe and Prof B.H.V. Topping, who, knowing our interest in BEM, kindly invited us to act as guest editors of this Special Issue.

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